

waves by means of a capillary;

a device for mounting the electronic component on the electrode of the circuit board through positional alignment;

5 a device for metallically bonding the gold bump to the electrode of the board with supersonic waves applied while shaping the tip so as to prevent collapse of a neck portion of the gold bump with a load applied from an upper surface of the electronic component by means of a tool; and

10 a device for bonding the electronic component to the circuit board by hardening the insulating resin interposed between the electronic component and the circuit board while correcting warp of the board and crushing the bump with a pressure force of not smaller than 20 gf per  
15 bump applied to the electronic component against the circuit board with heating by means of the tool, so that the electrode of the electronic component is electrically connected with the electrode of the circuit board.

According to a 35th aspect of the present  
20 invention, there is provided an electronic component mounting apparatus comprising:

a device for sticking a solid or semi-solid insulating resin layer, in which an insulating resin is mixed with an inorganic filler, to a circuit board or an  
25 electronic component;

a device for forming a bump, without leveling, by forming a ball by an electric spark at a tip of a metal wire on an electrode of the electronic component similarly to wire bonding and forming this on the electrode of the 5 board by means of a capillary;

a device for mounting the electronic component on the electrode of the circuit board through positional alignment; and

a device for hardening the insulating resin 10 interposed between the electronic component and the circuit board while correcting warp of the board with a pressure  $P_1$  applied as a pressure force to the electronic component against the circuit board and heat applied from an upper surface of the electronic component by means of a tool 15 heated to a specified temperature and subsequently bonding the electronic component to the circuit board while alleviating a stress caused when hardening the insulating resin by reducing the pressure force to a pressure  $P_2$  lower than the pressure  $P_1$  after a lapse of a specified time, so 20 that the electrode of the electronic component is electrically connected with the electrode of the circuit board.

According to a 36th aspect of the present invention, there is provided an electronic component 25 mounting method as defined in any one of the 25th through

27th aspects, wherein the inorganic filler mixed with the insulating resin is provided by a plurality of types of inorganic fillers, which have different mean particle diameters.

5           According to a 37th aspect of the present invention, there is provided an electronic component mounting method as defined in any one of the 25th through 27th and 36th aspects, wherein the insulating resin layer has a portion brought in contact with either the electronic component or the board, the portion having a smaller amount 10 of inorganic filler than that of the other portion.

According to a 38th aspect of the present invention, there is provided an electronic component mounting method as defined in the 37th aspect, wherein the 15 insulating resin layer has a portion brought in contact with both the electronic component and the board, the portion having a smaller amount of inorganic filler than that of the other portion.

According to a 39th aspect of the present invention, there is provided an electronic component mounting method as defined in the 37th or 38th aspect, 20 wherein the portion brought in contact with the electronic component is provided by an insulating resin that improves 25 adhesion to a film material used on a surface of the electronic component, and the portion brought in contact